What is claimed is:

1. A multifunctional apparatus and method to manufacture mineral fibers made of natural rock minerals such as basalts capable of forming fibers to be drawn / attenuated and gathered into a continuous strand, wherein said elemental fibers are produced from 7 μm to 100 μm in diameter having a stable amorphous structural state and exhibit flexible/ductile properties. Wherein different modifications of said apparatus are designed depending on basalt rock composition and glass body properties, comprising the key members:

(a) a vertical or horizontal depending on rock (basalt) minerals properties furnace member of said apparatus;

(b) two fore-chamber or retort members designed for melting of ground rock mineral, wherein said fore-chamber or retort members are positioned opposite each of other at the top of a vertical apparatus. Wherein only one fore-chamber/ retort is used for horizontal apparatus comprising one multi-zones horizontal valley ;

(c) a sloped valley (with adjustable angle) member is positioned beneath of each said fore-chamber/ retort. Wherein said valley comprises zones with different depths that promotes turbulent flowing that causes glass body volatile elements degasing and melted minerals mixing;

(d) In special embodiments for high-viscosity rock minerals a stack of horizontal valley members inside of said apparatus is used.

(e) a collector - glass body receiver member of said apparatus designed for glass body homogenization and the averaging of chemical composition and viscosity;

(f) a feeder member comprised of two sleeve members which is designed to provide

glass body distribution to the periphery bushings located beneath the sleeves;

(g) a step member is located between of each said sleeve and said collector. Wherein each step has an adjustable height to prevent the entrance of a high-specific gravity glass body components from collector to the bushings;

(k) two-chamber multi-sectional ceramic bushing member designed for glass body overheating, viscosity adjustment and fiber formation which is drawn /attenuated beneath the discharge wall which is comprised several orificed ceramic plates;

(l) a water cooled fin shield conduit member associated with discharge wall of a bushing comprising a wall made from refractory TiNi intermetallic. Wherein TiNi is a water vapor permeable material allowing the fiber manufacturing at suitable moisture environment.

2. An apparatus of claim 1, wherein said two retort members are able to rotate when the rock minerals are loaded and melted. Wherein each retort is comprised of two different cone shape shield members: the bigger one is housing a cone shield made of refractory metallic material and the smaller a ceramic cone (tipped melting chamber where the melting of rock minerals is proceeded) is made from a thermal shock resistant, high- dimension stability refractory ceramic material. Wherein said ceramic tipped melting chamber is an extension of the metallic cone shield that is engaged into the metallic cone shield in such a way that it can be removed when damaged during operation because it operates in harsh conditions which are more severe than those affecting the housing metallic cone shield.

3. An apparatus of claim 1, wherein said retort comprising natural gas containing oxygen burners and electric heating members is designed to melt ground rock minerals.
4. An apparatus of claim 1, wherein said sloped valley having an adjustable angle is positioned above said collector, wherein said sloped valley comprises a passageway with zones having different depths to provide glass body turbulent during flowing that causes an efficient mixing and volatile elements degasing.
5. An apparatus of claim 1, wherein when the high-viscosity and heterogeneous rock minerals are used a stack of horizontal valleys are positioned lower said sloped valley and above the collector. Wherein a stack of horizontal valley members are positioned inside of vertical furnace of apparatus one beneath the other designed to cause a glass body cascade as it flows toward the collector, wherein quantity of said horizontal valleys is varied depending on the glass body viscosity. Wherein the greater the viscosity the greater the number of horizontal valleys.

6. An apparatus of claim 1, wherein a valve member is located beneath the collector to provide a periodical removal of the high-specific gravity glass body components which drain off as they tend to accumulate at the bottom of collector.
7. An apparatus of claim 1, wherein a collector - glass body receiver is located at the bottom of vertical apparatus, wherein said collector is designed for glass body homogenization and averaging of both the chemical composition and a viscosity.

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8. An apparatus of claim 1, wherein a two-chamber ceramic bushing member comprised of the upper and the lower chamber member, wherein the lower chamber is abutted to the bottom of the upper chamber.

9. A two chamber ceramic bushing of claim 8, wherein said upper chamber of a bushing containing a glass body is connected to the collector (or sleeve) through the vertical tube which comprises a valve designed to provide the close/open operations.

10. A two-chamber ceramic bushing of claim 8, wherein the bottom of said upper chamber is referred to as an intermediate platform containing holes/ openings through which the glass body flows to the lower chamber. Wherein the holes/opening of the intermediate platform are designed the reduction of a hydrostatic pressure inside of the lower chamber.

11. An apparatus of claim 1, wherein said two-chamber bushing member made of refractory, thermal shock resistant and a high-dimension stability inert ceramic material.

12. An apparatus of claim 1, wherein said two-chamber bushing is located beneath of the collector (it is a central bushing) and the other periphery bushings are located beneath the sleeves, wherein two or three said bushings are located beneath the each said sleeve member.

13. A two-chamber ceramic bushing of claim 8, wherein said upper chamber of a bushing by volume is bigger than that of a lower chamber, wherein the ratio of the volumes of the upper and the lower chamber is depend on the high-melting point components content and the glass body viscosity properties.

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14. A two-chamber ceramic busing of claim 8, wherein said upper chamber designed for the glass body overheating to temperatures greater of that inside of the collector, wherein said overheating treatment operation is provided to decompose the high melting point complex oxides are contained in basalt glass body.

15. An apparatus of claim 1, wherein said two-chamber ceramic bushing comprises an external thermal insulating layer which is thick enough to avoid a high temperature gradient of both the upper and the lower chambers.

16. A two-chamber bushing of claim 8, wherein the bottom of said upper chamber - an intermediate platform is reinforced by several horizontal trusses, wherein said trusses are made from refractory, high flexural strength and highly-dimensionally stabile ceramic material.

17. A two-chamber bushing of claim 8, wherein said upper chamber is comprised external induction and/or internal cathode -anode heating members.

18. A two-chamber bushing of claim 18, wherein said external induction and an internal cathode -anode heating ~~members~~ are designed to overheat the glass body inside of the upper chamber of a bushing to decompose the stable complex oxides when ever they are present in the natural basalt ~~rock~~ minerals.

19. A two-chamber bushing of claim 18, wherein said overheating operation is possible due to electromagnetic wave transparent properties of the vertical wall of upper chamber and due to the electric conductive properties of basalt glass body.

20. A two-chamber bushing of claim 8, wherein in special embodiments ultrasonic devices can be used to provide the additional glass body treatment to accomplish the destruction of the most stable complex oxides when ever they are in the natural rock minerals.

21. A two-chamber bushing of claim 8, wherein an electric conductive shield made from a refractory, inert, electric conductive material, for example graphite (but not limited to), is located inside of upper chamber. Wherein the configuration of an electric conductive shield is adapted to that of interior of a vertical wall of upper chamber. Wherein said electric conductive shield member inside of upper chamber is used to increase the efficiency of induction heating of glass body inside of upper chamber when the basalt glass bodies with poor electric conductive properties are used.

22. A two-chamber bushing of claim 8, wherein the upper-chamber of a bushing is made from an electromagnetic wave transparent, high-wear and thermally-shock resistant refractory ceramic material, for example (but not limited to) Y_2O_3 stabilized Zirconia, AD-99.9%Al_2O_3, Cerox-1000, which is capable of long-term operation at temperatures in the range of 1650C to 1850C.

23. A two-chamber bushing of claim 8, wherein said lower chamber member of a bushing is designed to adjust the glass body viscosity by a gradual temperature reduction from the top to the bottom. Wherein the glass body viscosity adjustment is provided to stabilize the fiber formation.

24. A two-chamber bushing of claim 8, wherein said lower chamber comprising a discharge wall containing plurality ceramic orificed plates.

25. A two-chamber bushing of claim 8, wherein said discharge wall of said lower chamber is reinforced by several horizontal trusses made from a refractory, high flexural strength ceramic material.

26. A two-chamber bushing of claim 8, wherein said discharge wall comprising heating element member made from electric conductive metal-ceramic composite material, wherein electric conductive metal-ceramic composite associated with ceramic reinforced trusses.

27. A two-chamber bushing of claim 8, wherein the electric conductive metal-ceramic or metallic conductive layer - heating element associated with discharge wall is designed to control a glass body viscosity adjustment shortly before fiber formation.

28. An apparatus of claim 1, wherein said two-chamber ceramic bushing is mounted to and located beneath the collector and the sleeve members by means of a supporting frame member which is comprised of several traverses made of a refractory, high-flexural strength metallic material.

29. A two-chamber bushing of claim 8, wherein the electric conductive layer -heating element is adjacent the beneath of reinforced trusses through adaptive metallic layer - substrate. Wherein the adaptive metallic layer is deposited by D-Gun powder spray process on beneath of reinforced trusses surface. Wherein a discharge wall is divided from the metallic traverses associated with supporting frame by means of a refractory non-electric conductive and a thermal insulating layer.

30. A two-chamber bushing of claim 8, wherein a water cooled fin shield conduit member is located beneath the discharge wall of said lower chamber of a bushing.

31. A two-chamber bushing of claim 8, wherein each water cooled fin shield conduit member comprising a wall made from refractory TiNi intermetallic materials, wherein the TiNi is a water vapor permeable porous material allowing the manufacture of amorphous fibers to be drawn /attenuated in a suitable moisture environment.

32. A two-chamber bushing of claim 8, wherein said water cooled conduit fin shield members are adjacent to metallic traverses of supporting frame through the non - electric conductive , thermal insulating layer.

33. An apparatus of claim 1, wherein a vertical shaft member is located at the center inside of furnace and extended from the top to the bottom of the furnace of apparatus. Wherein central vertical shaft is designed to support the stack of internal horizontal valleys positioned inside of furnace.

34. An apparatus of claim (1), wherein said furnace member , depending on the mineral (basalt) rock chemical content and viscosity properties, can be modified to the vertical or horizontal when low-viscosity rock mineral basalts are used, wherein said vertical apparatus comprises either two retorts or two fore-chambers positioned at the top of the furnace opposite each other.

35. An apparatus of claim 1, comprising two sleeves associated with feeder -distributor of glass body to the bushings. Wherein each sleeve is connected to the collector

through a step. Wherein the height of step between the collector and each sleeve is designed to prevent the entrance of high- specific gravity components to the periphery bushings.

36. An apparatus of claim 1, wherein said fore-chamber /retort and two-chamber ceramic bushing members can be easily changed when damaged during operation. For example retort which comprise two cone shields, including ceramic melting tipped chamber (associated with retort which operates at the extremely harsh condition) can be easily removed and replaced without interruption of apparatus operation. The same the lower chamber of ceramic bushing comprising multi-sectional discharge wall containing plurality orificed ceramic plates of ceramic bushing members can be removed repaired/replaced. This operation is provided when housing upper chamber of a bushing still remains in place.

37. An apparatus of claim 1, wherein said sloped valley member can be used in combination with stack of horizontal valleys when a high-melting point component basalt rock mine~~rals and a~~ high viscosity glass body are used.

38. A method of claim (1), wherein the continuous mineral (basalt) fiber manufacturing is carried out through the sequence operation of the key members of apparatus comprising the steps of:

(a) -a method of softenable minerals (pure basalts rock minerals with or without supplemental minerals) melting in the fore-chamber or retort members utilizing combination of natural gas containing oxygen and electric heating system;

(b) -a method of turbulent flow of melted mineral through a sloped valley which contains zones with different depths which cause the volatile elements degasing and glass body mixing;

(c) - a method of cascade flow toward the collector through a stack of horizontal valleys positioned inside of vertical furnace above the collector, wherein said cascade flow enables the glass body to degas, mixing and to decompose complex oxides, wherein said cascade flow method is used when the highly-viscosity heterogeneous basalt rock minerals are used ;

(d) -a method of homogenization, averaging by chemical composition and viscosity of natural basalt rocks glass body inside of collector utilizing electric heating system;

(d) - a method of outlet of a high-melting point (high-specific gravity glass body contaminants from the bottom of said collector member through the valve outlet positioned beneath of said collector;

(f) -a method of homogeneous glass body distribution from the collector member to the periphery bushings utilizing two sleeves of a feeder connected to the collector through the step by height adapted to prevent the entrance of high -specific gravity contaminants into the periphery bushing(s).

(h) -a method of overheating of glass body in the upper-chamber member of said bushing to the temperature (100-250 degree C) greater than an average temperature inside of collector. Wherein the overheating treatment operation capable destruction of a high-melting point complex oxides "clusters" that cause the improvement of the mechanical properties of mineral (basalt) fibers;

(k) -a method of destruction of the most stable clusters inside of upper-chamber by means of an ultrasonic action with determined waves frequency and amplitude,

(l) -a method of fiber formation beneath the discharge wall of said bushing, wherein a suitable moisture environment of fiberization is created by a water cooled shield conduit member comprising a sheath made of porous TiNi material.

39. A method of claim (38), wherein said continuous mineral (basalt) fiber having amorphous structural state from 7 μm to 100 μm in diameter with flexible/ductile properties are environmentally friendly because are made from the natural rock minerals which are not contain chemically active boron oxide. Therefore basalt fiber suitable for a variety of industrial applications. Wherein the industrial applications depend on the diameter of fibers, for example, but not limited to as follows:

(a) Basalt fiber from 7 μm - 20 μm in diameter gathered into roving/strand or yarn (including chopped roving) is suitable to produce: electric cable cords; high-temperature boards and insulators; fire resistant fabrics /textiles; inert corrosion resistant underground drainage system reinforcement, fiber reinforced plastics; integrated circuit boards; a variety of reinforced composites concretes; corrosion resistant cables/rebars; fiber reinforced wood/plywood frames/trusses; fiber reinforced dielectric matrix substrates; thermal and /or sound insulation and vibration suppression materials.

(b) The coarse basalt fibers from 20 μm to 100 μm in diameter which are lower in cost when compared to the roving mentioned above are suitable also for long-

term Three- Dimension Fiber Reinforced Composite/Concrete (3-D RFC); Low-cost coarse fiber is also suitable for ocean going reinforced concrete oil well drilling platforms, naval construction concrete; boat and car composite frames, deck bridges, fiber reinforced W-beam guardrail systems, highway concrete pavements and many other applications.

40. A method of claim 38, wherein said basalt fibers are manufactured from a variety basalts with variety of petrology, morphology and chemical composition characteristics. Wherein said basalt fibers can be produced for example (but not limited to) from the Northern Wisconsin / Minnesota including Dresser Trap Rock basalts which are found in great deposition around Lake Superior. Also these deposits (gabbro basalts) significantly extend to the South, to Kansas and to the East to include a Michigan State area. Wherein many mineral rock deposits are available as the supplemental rocks to the Northern Wisconsin/Minnesota (NW/M) including Dresser Trap Rock - DTR (olivine, andesite , pyroxene, high-moduli acidic, Al- rich) basalts. Wherein the NW/M and DTR basalts are available to manufacture continuous amorphous basalt fibers from 9 μm to 80 μm in diameter with flexible /ductile properties.